

The History Project

The Impact of Banking Crises on Trade: Case of the 1866 Overend & Gurney Failure

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1 Introduction

Great Britain was an early industrializing nation and in the 19th century a global center of both trade and finance. The Empire formed the basis of a trade network in raw materials and manufactured goods, and London's money markets financed both domestic and global investments. Over the period 1854 - 1879, the value of total imports and exports more than doubled, from £249.6 to £563.5 million. The remarkable growth was tempered with a number of banking crises, which in the days before modern central banking, led to financial panics and economic disruption. The 2008 global financial crisis has also inspired much work that documents how credit supply shocks impact the real economy. This paper poses this question in a historical context, where the outcome of interest is the volume of trade from Britain.¹

The late 19th century was a particularly interesting time for the development of monetary policy, and the relative institutional transparency lends clarity to the financial flows of interest. International trade during this era of slower communications and higher transportation costs required significant financing to provide the necessary working capital. The lag between sending goods to market and receiving payment for those goods was often several months. Although some merchants could self-finance, the majority relied on banks, and were therefore subject to both idiosyncratic and systemic financing risks. More recent work in the corporate finance literature has found evidence of creditor specialization in markets, which lends the variation in creditor depen-

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¹Throughout the paper, 'Britain' will be used to refer to England and Wales, but not Scotland. Scotland's banking system was regulated independently, and it is generally discussed separately.

dency necessary for observing the predicted patterns in outcomes.² These patterns of specialization are likely to be enhanced in the 19th century since commodities production was highly fragmented, and communications were slow.

The empirical strategy draws on Amiti Weinstein 2011³ and relies on variation in the source of financing among Britain’s trade partners, and in particular the health of banks they used for credit.⁴ By matching merchants and firms with the financial institutions that provided trade credit, it is possible to establish a causal relationship between the health of those institutions and the export growth of trading partners. For instance, some merchants in Prussia may have relied more heavily on banks that sustained more losses during a crisis whereas others in India had ties to healthier institutions. Given fixed external financing demand, trade with Prussia would decline following a credit supply shock. This “trade-finance” channel more generally predicts a negative relationship between trade flows and the health of the banks financing those flows.

Little work has been done to assess the impact of financial shocks on trade historically, and nothing of this empirical nature. British banking crises and the banking sector more generally has been the subject of many studies (Collins 1989, Kindleberger 2011, Turner 2014), but they primarily focus on the emergence of the Bank of England as a lender of last resort. Although much has been written on the Bank’s credit policy, this paper does not model early monetary policy so much as study the consequences of it. This work is related to an extensive literature on the role of finance in the Industrial Revolution and the growth in industry and trade more generally (Floud McCloskey 1994). It contributes evidence that the trade-finance channels in the 2008 financial crisis⁵ have historical precedent.

The empirical analysis is limited to the 1866 crisis, but the project could feasibly be extended to include those in 1847, 1857, and 1878 as well. 1866 was chosen as a starting point because the Overend & Gurney crisis was triggered by a financial market failure rather than declines in real output. It is also historically significant because the Bank of England acted quickly and decisively to ease the liquidity strain in money markets by lending freely at the discount window. These crises all disturbed the availability of credit in the economy through the trading of the primary credit instrument, the bill of exchange. The years following these crises, particularly 1857 and 1866, also saw declines in the value of trade in an otherwise upward trajectory.

The preliminary results are based on half of the available 1866 data. The credit supply has

²Paravisini Rappoport Schnabl 2014 use Peruvian credit-registry data and find that such specialization increases banks’ exposures to particular markets and reduces their diversity and suggests that banks gain comparative advantage by investing in the market-specific relationships and institutional knowledge.

³Their paper focuses on Japanese exports during the 2008 global recessions, but the historical data are rich enough to employ their method for trade at the country-level.

⁴The term ‘banks’ and ‘financial institutions’ will be used interchangeably throughout. Shadow banking institutions such as discount houses provided trade credit and were a significant component of the financial system. Capitalized ‘Bank’ will refer exclusively to the Bank of England, as is the norm in the historical literature.

⁵Papers on this topic include Amiti Weinstein 2011, Auboin 2009, Chor Manova 2012

a significant effect on decreasing exports of British-made goods. The magnitude is a 1% decrease in trade, which is economically significant as well. The impact on total exports, which include goods made in the Empire, is not significant, even after controlling for Empire destinations and an interaction effect. Aggregating to the country level for trade outcomes has diluted much of the variation available in the credit data, and future work will focus on using city-level trade data.

The data presented here were gathered from primary and secondary sources from the Bank of England archives and digitized for analysis. The Data Appendix describes each series of the ledgers in detail. Section 2 provides an overview of the historical context and financial institutions, section 3 an explanation of the trade finance channel, section 4 a summary of the data, and section 5 the preliminary empirical results. Section 6 concludes and discusses plans for future work.

2 Historical Background

2.1 London money market

The use of international bills to effect trade remittances was centuries old and presumably the ‘open credit’ was also a time-honoured institution. The famous ‘open credit’ was nothing more than the assumption on the part of the ‘banker’ of the merchant’s risk, such that the banker gave credit on faith that the merchant would be able to give adequate security later...payment would be forthcoming from abroad either in goods or bills in time for the accepting house, the British house, to cover its obligations.

-Hughes 1960, p. 49-50

England’s financial revolution occurred in the 17th and 18th centuries following the introduction of several significant credit institutions from the Netherlands, including foreign and inland bill of exchange, the stock market, and virtually riskless annuities (consols) issued by the government (Neal 1993). These institutions provided the basis for a credit market centered in London and radiating outward. Local financial intermediaries, primarily the country banks, each had London corresponding banks, which coordinated the flow of capital throughout the country from areas with excess to areas offering investment opportunities. The London metropolitan banks included notable names such as Barclays, London & Midlands Bank, and Lloyd’s. Although local firms could be funded solely from local savers, the availability of London’s capital equilibrated rates throughout the country, conditional on an appraisal of the firm’s opportunities and risk.

At the beginning of the century, the British banking system was highly fragmented with small communities being served by individual country banks. They grew rapidly in the early part of the century, numbering only 100 in 1775, 370 in 1800, over 600 just before the 1825 crisis, and peaking at over 1100 in 1838 (Cameron 1967). They served the economic needs of the community

by providing remittance facilities in the area and to London, offering interest-paying deposits, discounting bills of exchange at a discount, offering loans to firms, and sometimes issuing bank notes.⁶ In most areas of the country, they replaced the goldsmiths, scriveners, and attorneys that had previously conducted such business.

Following the Act of 1826, which lifted the six-partner limit on note-issuing banks outside a sixty-mile radius of London, the banking sector began the transition from individual country banks to joint-stock banks with multiple branches. Joint-stock banks competed by offering interest-bearing deposits to savers, funded by short-term investments in bills of exchange and long-term loans to firms. To maximize profit, banks kept the minimum amount of cash necessary to satisfy daily demand deposits, and making up shortfalls or capitalizing on excess on the interbank market. Reducing the margins on capital stocks led banks and discount houses to rely more heavily on the Interbank market or the Bank of England to meet their liquidity needs.

The bill of exchange served as the primary credit and payment instrument, which at its height was used alongside and even instead of cash.⁷ It was created in the Middle Ages to facilitate trade, and while foreign bills retained this purpose, inland bills were often originated for pure financial purposes. At its simplest, a bill designated two main parties, the ‘drawer’ and ‘drawee.’ Figure 1 illustrates the credit mechanism in the bills market, which included third party financial institutions that held onto bills as reserves or investments. Bills originated from a merchant or banker (the drawer), which the drawee ‘accepted’ by signing the bill (step 1). When the bill matured, usually in 30-90 days, the drawee would be able to present the bill at the drawer’s bank and receive the amount designated on the bill (step 5). The drawee could also sell his investment by ‘discounting’ it at a bank or bill broker at the prevailing market discount rate for the remaining time on the bill (step 2). Banks could also rediscount the bill with other banks, specialized discount houses, and the Bank of England (step 3). This could occur individually or in bundles. Each buyer re-endorsed the bill, which made him accountable if earlier creditors defaulted, and the string of serial endorsements alleviated aggregate default risk.⁸

Foreign bills were also a means of payment in trade, in which case the roles of drawer and drawee in the previous diagram are reversed. Merchants used them to settle accounts with each other in multiple ports and currencies. In the case of foreign bills, there is a drawer and drawee on one side, and a payee and payer and on the other side. It allows payment for trade through

⁶Not all banks issued notes, and those that did were limited to six partners by the 1708 law that renewed the Bank of England’s charter. In the Bank Act of 1844, the Bank of England full rights over note issue, although pre-existing private bank notes were allowed to stay in circulation.

⁷In Lancashire, the bill almost completely replaced coins and bank notes as the primary means of settling transactions (Thornton 1802 [20]).

⁸Defaults did occur, especially in remote areas where the credit-worthiness of individuals were harder to ascertain. In the case of default, banks usually sent agents to find the originators, and when this was unsuccessful turned to the other endorsers. Default was not such a large risk that it warranted much commentary by contemporaries. Indeed, the mechanism that prevented default has been a question of interest for many.

short-term movements in capital. In Figure 2, the London importer buys a bill from a merchant bank (step 1), which allows him to remit the bill in payment for goods (step 2), which the exporter in Bombay takes to the merchant banker it is drawn against. The merchant might post partial collateral or some other securities to the bank, but it was often the case that no collateral was necessary at all (Hughes 1960). The bank is then underwriting the bill and extending the merchant credit for the maturity of the bill. The payer in Bombay accepts the bill, which means he will have the amount specified ready for the holder of the bill when it matures. The accepted bill is now a financial instrument that can be used to pay other debts (step 3) and circulate until it is cashed in on its expiration date by the last holder. The final debt is extinguished when the the final holder sends it back to the original drawer (step 4), and the drawee repays the Accepting bank. Note that the Drawer and Payer could be branches of the same establishment, which further reduced the risk of default by the acceptor.

Figure 2 demonstrates how bills financed trade, but they were also an investment that earned interest. This method could be used for either selling British goods abroad or providing funds for foreign agents to import goods to Britain. Although posting collateral provides an explanation for why there was not widespread default, it appears that credit was in fact quite ‘open,’ and British bankers rarely required it. Foreign securities investment expanded by five times during the period from 1855-1870, and foreign bills greatly outnumbered inland bills (Quinn 2004). This great internationalization of the British bills market meant that London was increasingly financing trade throughout the world.

As the bills market became liquid enough to act as short-term investments and reserves, intermediary roles became more specialized.⁹ Firms such as Alexander Cunliffes & Co, and the National Discount Co sold their acceptances for a fee but also bore the credit risk of their drawers. Joint-stock companies held bills as reserves, exchanging them with bill brokers to fulfill their daily transactional needs. Some discount houses, such as Overend & Gurney, also held bills as investments. The market discount rate was determined by the willingness of these banks and brokerage houses hold bills over notes, and it was usually 2% less than the Bank Rate. However, during panics, even extraordinarily high market rates were not enough to satisfy the demand for liquidity, and the discount market turned to the Bank of England.

2.2 The Bank of England

The Bank of England had a unique role in the London markets because it was a private commercial bank with monopoly privileges as the government’s banker. Established in 1694, it was the sole joint-stock banking company until 1826, and from 1844, it had a monopoly over

⁹King (1936) and Sayers (1970) are the classic authoritative works on the London money market during this period and provide much more detail.

note issue. From 1844, the Bank was divided into independently functioning Commercial and Issue departments. The former oversaw the profit-making functions while the Issue department controlled the money supply and was a precursor to the modern central bank. The 1844 Bank Charter Act also limited the fiduciary issue to £14 million, after which all notes had to be backed completely by gold (O'Brien 1997). The Act could be suspended, and indeed it was in the 1847, 1857, and 1866 crises. However, it was not until the 1866 event that the Bank's response was immediate and had the largest impact.

The Bank Discounts Office ran the daily discounting activities, which were available all days except Sunday and public holidays, giving 311 banking days. Originally it only discounted bills, but later it also provided cash advances on securities. Acceptable securities included government, empire, and some railway bonds (Bank of England Archives C31/3). Bills discounted at the Bank were subject to high standards. The Discount window was technically only available to customers who had accounts with the Bank, although exceptions were made for notable individuals. Originally only tradesmen and merchants, but not banks, could discount at the Bank, but this policy was relaxed in the 19th century. Bills were limited to maturities of 60 days or fewer, and the Bank often rejected those that had been rediscounted several times.¹⁰ The Bank never re-discounted, so bills brought there were effectively taken out of circulation. Given the availability of the cheaper Interbank market, joint-stock and private banks rarely discounted at the Bank of England if liquidity was available elsewhere.

The Bank Rate was the established rate for discounting, akin to the modern Official Bank Rate and Federal Funds Rate. This announced rate was widely published and was generally higher than the market rate. It was set by the Special Committee on Discounts and summary statistics are given in Table 1 during the years of banking crises. In this table, it is apparent the 1878 crisis was of lesser magnitude than the others as the Bank rate was only raised to 6% at its peak. Although this figure was fixed for long periods of time (often months, and sometimes even a year or longer), the Bank actually discounted in a band of 1% on either side (Bank of England Archives C28 series). How the Bank dealt with idiosyncratic default risk remains an open question, but it is likely that facing reduced or no credit at the Bank was sufficiently costly, and that the Bank could manage riskier bills by rejecting them.

2.3 Banking crises

Banking crises were incredibly common prior to the late 19th century, and in fact occurred about once per decade. They diminished in severity as the century progressed, and in fact there are disagreements over whether the 1866 Overend & Gurney or the 1878 City Bank of Glasgow was the

¹⁰It frowned upon re-discounting because it was perceived as 'loose' banking, but as the secondary market in bills grew, these restrictions were also increasingly relaxed (King 1936).

last ‘crisis’ (Collins 1989). Crises were triggered by exogenous shocks such as a commodity price shock due to harvest conditions, or by bubbles in the stock market bursting such as the railway mania of the early 19th century. The demand for Bank of England notes by banks and depositors meant that institutions were unwilling to discount bills, making them highly illiquid instruments. Without this normal source for short-term liquidity, many banks suspended payments or were forced to close. Although these episodes are described as widespread panics, they affected some firms more severely than others due to variation in reserves and investments. While they all acted with caution during the height of the crises, recoveries varied depending on the extent of liquidations or decline in the value of their underlying assets.

In this environment of cyclical panics, the Bank of England moved toward a role of stabilizing the markets. However, its commitment was not guaranteed, and uncertainty about the Bank’s actions was enough for the markets to seize entirely. In the aftermath of the 1866 crisis, Walter Bagehot, the then-editor of *The Economist*, published *Lombard Street*, which detailed what became the ‘Bagehot rules’ for central bank intervention during liquidity crises. His idea that there should be a mechanism in place for supplying liquidity during panics was already familiar, and his primary argument was for the Bank of England to acknowledge its role as lender of last resort *de jure*. The Bagehot rules outlined several principles for successful interventions, usually summarized as ‘lend freely’ on ‘good collateral’ at ‘penalty rates.’¹¹

The scramble for liquidity is evident from the discounting activity during the crisis years (Figures 3 - 6).¹² It is important to note that the scale for these figures differ, demonstrating the changing size of the economy, the scale of the crisis, and the importance of the discount window. Figure 7 places them on the same scale. In each graph, the blue line depicts the “Total Credit” issued by the Bank of England, which comprised of bills and advances. The green line shows the proportion which was bills, and the red line depicts rejections. The Bank did not offer advances before the 1850s, so Total Credit in the 1847 crisis is also Total Discounts.

There were two crises in 1847, both caused by events in financial markets. The April crisis was triggered by the Bank of England when it suddenly raised the Bank rate while aggressively tightening discounting. The latter can be seen clearly in Figure 3. This led to a severe contraction in domestic credit where even the best banks were short of liquidity. The second one in October was due to an internal drain that raised doubts about the convertibility of private bank notes (Dornbusch 1984). Demand for discounts spiked, along with rejections as the Bank attempted to shield its reserves. Only after the Bank Act Suspension was confidence restored, discounting activity returned to normal. This chain of events was a precursor to established central banking principles.

¹¹Bagehot never formally called these rules, and there remain debates today about how these terms should interpreted. It was also not his intention to use high rates as a mechanism for deterring moral hazard, but rather a mechanical necessity for maintaining reserves under the gold standard.

¹²The sources for these data are discussed in section 4.

The Panic of 1857 was a world-wide economic downturn originating in the U.S. with the failure of the Ohio Life insurance company. Exports had grown quickly during the decade, and British firms made up the current account deficit by investing in American stocks and bonds. Railway bonds were particularly popular and were the first to fall. Merchants and manufacturers in northern England who traded with American firms were the first to be affected. Their liabilities in turn compromised banks and discount houses, and the panic spread from Liverpool to Glasgow, London, and the continent. The Bank Act was suspended in early November to provide emergency liquidity, but fear of contagion wiped out £42 million of investor capital (Turner 2014 [21]). Following the crisis, the Bank withdrew discounting privileges for the discount houses in order to prevent the excessive risk-taking that had magnified the liquidity crisis and panic that year.

The 1866 Overend & Gurney crisis was triggered by a crash in the price of cotton, which raised doubts about the value of collateral based on this commodity. Overend & Gurney was the largest London bill broker that had become a public joint-stock company the previous year.¹³ Losses in the stock market and bankruptcies by customers led the house to suspend payment on May 10th. The Bank refused to rescue Overend & Gurney, and the markets panicked, as evidenced by the huge spike in discounts that day. The Bank Act was immediately suspended on May 11th, and markets returned to normal soon thereafter. The rejection rate remained low throughout the crisis, and the Bank discounted almost £2 million of bills on the first day alone. It also lent a further £1.5 million in advances, which brought the total capital injection to £4 million. This episode was the main inspiration for Bagehot's recommendations for central banking during crises.

The 1878 crisis was the smallest of the four, and it also occurred when the importance of the discounts market was beginning to decline. It was set off by the failure of the City of Glasgow Bank in October, which due to unlimited liability, led to a string of other bankruptcies. The Bank Act was never suspended, and therefore the Bank protected its reserves with higher rejection rates. The lag between the initial failure and subsequent bankruptcies is also evident in the way the demand for discounts in London peaked at the end of the year, almost two months after the initial failure (Collins 1989). Following these episodes, the British banking sector was crisis-free until 2007. The sector underwent an amalgamation movement that reduced competition but also arguably stabilized it (Sykes 1926). The role of the Interbank market in re-discounting bills also declined as banks held larger reserves and Bank note circulation grew to accommodate economic activity.

From these data, it is clear that the nature of discounting evolved over the four crises. The 1847 crisis had the highest rejection rates, which peaked with credit demand, suggesting the Bank was engaging in credit rationing. The subsequent crises had very low rejection rates, and the increases in liquidity provision are clearer. During the height of the 1857 and 1866 crises, advances

¹³The prospectuses were very promising and gave no indication of the speculative investments on their balance sheet. At the time of its failure one year later, it owed over 11 million pounds. Following the failure, the partners were tried and found guilty of fraud.

comprise of almost half the total credit. The transactions data show that it is primarily financial institutions that used advances while private discounters continued to bring in bills. These are also the largest in magnitude, which is clear from Figure 7. The turbulence in 1847 is incredibly minor compared to that of later years, which partly reflects the Bank's smaller role. The duration of money market instability is shortest in 1866, when the amount of discounting has a clear spike with only a few small aftershocks.

3 Trade Finance Mechanism

A flexible credit system was and still is necessary to accommodate uncertain trade conditions arising from 1) the longer timespan needed to complete international transactions relative to domestic transactions and 2) the greater difficulty for exporters and their banks to find recourse in case of default. The credit mechanism originating in the bill of exchange is still used today and are known as letters of credit (Amiti Weinstein 2011). As shown in Figure 2, after a bill is issued to the drawee, default can occur at any stage, and losses will be incurred by the Accepting bank. Banks are the first to experience losses from defaults as in the crises of 1857 and 1866. Their losses also lead them to tighten credit which, in the dense interbank lending network of the 1850s and 1860s, further tightened credit.

Banks are also the primary financiers of trade, which ties the supply of credit to the health of these financial institutions. When the financial health of a particular bank (or of the entire banking sector) declines, it is more difficult for them to raise funds, either through borrowing from other banks, securing advances on assets, or issuing equities. In systemic liquidity crises when the interbank market dries up and there is no time nor market for issuing equities, the Bank of England is the only source of credit. As banks suffer losses from failed investments, customer withdrawals, and fewer sources of liquidity, they must cut back on lending. There is also greater demand for holding liquid assets such as government bonds that are readily saleable on the London market or can act as security on advances. Bills also have relatively short maturities of a few months so traders depend on banks to constantly roll over and reissue credit.

Since the Bank of England raises the cost of borrowing during crises, financing costs are higher on both the intensive and extensive margins. Even if banks are willing to lend, merchants may not be able to afford the rates, which also depresses trade. The 19th century banking crises led to outright failures for some banks, mild to severe losses for others, and more cautious credit policies all around. The empirical analysis focuses on these severe contractions, but with finer data, it is possible to detect the impact of relatively small declines in bank health.

4 Data

4.1 Credit data

This paper uses previously undigitized records at the Bank of England archives which document each transaction at the Discount Window. Bills brought in and accepted are recorded with their location of origin, drawer, original acceptor, discounter, maturity date, rate, and amount. These are the most detailed data available during that time period and make it possible to construct bank-creditor relationships. The variation in the health of a country's creditors leads to the proposed credit supply contraction and decline in real activity.

There are several series of ledgers of interest that cover the majority of the 19th century, beginning with the first crisis in 1847.¹⁴ First, the daily ledgers (Bank of England Archives series C28) record the activity at the discount window and thus the amount and rates of the Bank's liquidity provision. Rejections were also noted, and reasons were occasionally given, but rejected bills were not included in the customer ledger.¹⁵ These form a time series of the Bank's operations in aggregate and also for each individual. Second, the customer ledgers of discounters and acceptors (BOEA series C22, C24, C25, C26) document the history of their liquidity provision and thus the total credit extended by the Bank at any given time. Each transaction was recorded in these two sets of ledgers. In addition, the Bank kept ledgers on bills in default (BOEA 7A283/3), which allowed them to track the creditworthiness of their customers and pursue other endorsers for repayment. Finally, there are ledgers (BOEA series C35) documenting how the credit line assigned to each customer changed each quarter, which accounts were opened and closed, and the primary business of the account.

The Bank sources are particularly valuable for providing an unbroken, systematic account of liquidity provision in the late 19th century. Even modern data of this nature has only recently become publicly available from the Federal Reserve Board, and it only starts in 2010 with 2 year lags. It is highly unlikely there are any other systematic sources for financial data as private bank archives either did not retain these records or else keep them private such that systematic analysis is very difficult. Mergers and failures also led to records being destroyed (Orbell Turton 2001). In addition, these data have not been exploited systematically for their insights into finance and credit broadly nor the trade sector more specifically.¹⁶

Figure 8 shows how for each daily transaction, the Discounter's name is listed along with

¹⁴Records fewer than 100 years old remain sealed for confidentiality reasons as they reveal the business practices of the Bank's customers.

¹⁵Bills were sometimes rejected *en masse* from a customer, but each one was assessed separately. Common reasons for rejection include maturity dates greater than the Bank's 60-day allowance or suspected forgery.

¹⁶Bignon Flandreau Ugolini 2012 mention these data and use them to assess the Bagehot rules, and in particular the manner in which the Bank prevented moral hazard.

the number of bills brought in, the rate charged, the total value of the bills, and the value of those rejected. The aggregate daily discounting from the four banking crises have been digitized and make it straightforward to compare a discounter's demand to the aggregate over any window of time. It is also possible to match the Discounter with his individual accounts (C22), which provide details of each bill. There, the geographic origin of the bill is given along with the bill's original Acceptor (if different from the Discounter), maturity, and the original Drawer. All bills presented to the Bank can thereby be linked with the geographic origin of the Drawer (original debtor) and his creditor (the Acceptor). One potential point of confusion is that financial institutions acted as both Acceptors and Discounters, and not all Acceptors and Discounters were financial institutions. A discounter might bring in twenty bills, all of which were originally accepted by others. The value of the bills brought in for discount at the Bank is therefore a measure of the discounter's liquidity needs whereas the acceptances documented on each bill is a measure of how much credit the other institutions granted. The daily discounts ledger contains comprehensive data on the former while the customer ledgers contain the latter.

The primary concern with these data is that the selection process for institutions to become Bank of England customers and the selection process for bills brought to the Bank are both not clear. Contemporary and secondary sources and documentation at the Bank Archives have been searched, but there is little discussion of how the Bank selects its clientele or how why they go to the Bank of England instead of the interbank market during normal times. During crisis periods, it is clear that the Bank is the only place to reliably obtain liquidity. It is also the only place that would likely fulfill orders for large magnitudes.¹⁷ However, given the Bank's exacting demands on bills, the relatively low default rate, and evidence that it actively monitored each account's credit, it is likely that bills presented to the Bank were of superior quality. Higher rejection rates during crises make it unlikely that the Bank relaxed standards during those periods. Indeed, prior to suspending the Bank Act, it may have been a way to protect its own reserves.

The data collection is still in process and currently focuses on the 1866 crisis. There are 187 banks in the sample, of which 138 have usable creditor data. The results in the paper come from 77 of those banks. Summary statistics for the evidence so far is in Table 2. About 18% of banks suspended payments, failed, or lost their accounts at the Bank of England. The average liquidity demand quadrupled from the pre-crisis to crisis year. The bank-level change in liquidity demand will be the measure of the severity of the credit crisis and will be discussed in more detail in the empirical section.

These data also give the size distribution of banks based on the credit they issued, with the top ten given in Figure 9. The majority of these were based in London, although some, like the Bank of Liverpool and North Western Bank were in the industrial trade cities in the north. Since the Bank of England likely accepted the bills of highest quality, their prominence in this data

¹⁷For instance, Nathan Rothschild's transactions with the Bank were usually around £10,000.

reflects both size and creditworthiness.

The bill credits also specify the place of origin, which has been aggregated to the country level because the trade outcomes are currently in the country level. Future work will focus on finding and using more disaggregated trade outcomes that can exploit the finer level of detail in the credit data. Figures 10 and 11 show these credit relationships in terms of number of banks and total value of credit respectively. To the extent that the bills brought in to the Bank of England may not be representative of the universe of bills, these relationships will deviate from the true distribution.

4.2 Trade data

Annual trade data are available from volumes of the *Statistical Abstract of the United Kingdom* published by the Board of Trade. These records include all the colonies and other major trading partners. By 1866, it is also possible to distinguish between exports of British & Irish produce only as opposed to all goods including those from other countries.¹⁸ One limitation is that it is not possible to obtain the annual commodity breakdown per country and therefore to distinguish among more elastic and inelastically traded goods. Another limitation is that these data begin in 1854, which means an alternative source will need to be found for the 1847 crisis. An avenue for further research would also be to understand which goods are more sensitive to trade credit. Figure 12 shows the density of exports to destinations worldwide. Unsurprisingly, there is a large overlap between Britain's trade and financial penetration.

The most promising source for less aggregate data is the *Lloyd's Lists* that were published daily starting from the 18th century. These record the movements of ships that entered and left England's major ports, and include their destination and origin. These records would lend finer chronological and geographical variation to the outcomes and tighten the proposed credit supply channel. In addition, multiple cities within a country would make it possible to include country fixed effects, thereby addressing some endogeneity concerns.

5 Empirical Method

5.1 Reduced Form IV estimation

The empirical estimation examines the impact of British bank health on exports to other countries. An OLS regression of changes in credit on trade would be endogenous. First, there may

¹⁸The majority of exports is of British & Irish goods, so it would appear that re-exports were not significant or else were not counted by the Board of Trade.

be reverse causality. Banks tended to concentrate their investments within certain geographic areas due to the high fixed cost of establishing connections and gaining adequate knowledge about an area or commodity. Therefore, it is possible that a bank is adversely affected by economic conditions abroad and exports performance drive bank health rather than vice versa. Second, there may be an omitted variable affecting both exports and bank health, such as exposure to negatively performing equities or bonds. Indeed, this is the case for banks invested in U.S. railroad bonds during the 1857 crisis. In addition, results are likely to be biased toward significance if countries that experienced the greatest decline in credit were less able to obtain alternative forms of finance. There are also potential biases in the *Liquidity* measure if banks that were particularly unhealthy did not approach the Bank at all (due to not having bills of high enough quality or securities for advances) or they did so in a manner outside the Discount window. These concerns are less likely to be a problem as only sufficiently credit-worthy institutions had accounts at the Bank, and it was disinclined toward granting private loans to other financial institutions.

Exports are also related to a number of other factors, such as factor prices, endowments, exchange rates, and industry demand. Although it is possible to directly measure the change in credit granted to individual firms, and therefore obtain firm-level variation in finance, there are no data on firm-level trade flows. It is also difficult to run the analysis at the industry-level due to uncertainty about the nature of a particular firm's business. However, it is possible to control broadly for characteristics of the importing country such as GDP, exchange rates, and (trade route) distance to Britain. There is the additional concern that credit demand changed along with credit supply, and hopefully this can be addressed by controlling for GDP and instrumenting for the severity of the crisis.

To address the problem of reverse causality, I propose a two-stage regression using the severity of the banking crisis on individual institutions as an instrument for the impact on exports growth. The exclusion restriction requires that banking crises affected exports from Britain but that countries that Britain exported to did not create banking crises. The restriction exclusion is not satisfied for the 1857 crisis because that crisis originated in the U.S., which was a large exports market and the source of the global economic downturn. However, the 1847, 1866, and 1878 crises were all due to domestic conditions with the latter two due to specific banks. In addition, it is possible to analyze the 1857 crisis excluding trade with the U.S.

The first stage estimates the direct influence of *Liquidity* by all banks b providing *Credit* to i . t denotes the year of a crisis and Δ is the difference in value between the year in subscript and the previous year. *Exports* is the value of goods in £, *Liquidity* is an measure of the credit needs of a bank, *BANK* is an indicator variable that equals 1 when there has been a bill originating in i that has been accepted by b , i.e. when a bank has extended credit to firms in a country. Conceptually, it captures ex-ante credit relationships, so it is based on observed credit relationships between $t - 1$ and t . w_{ibt} weights the importance of bank b by its relative presence in country i . X is a vector of

controls that ideally would account for other factors other than credit affecting trade.

$$\Delta \ln(Credit_{ibt+1}) = \alpha_0 + \alpha \Delta \ln(Liquidity_{bt}) * BANK_{ibt} * w_{ibt} + \delta X_{it} + \varepsilon_{it+1} \quad (1)$$

It is important to note that the data generating process means that mechanically, fewer bills are brought in for discount during non-crisis years compared with crisis years, which in turn generates a decline in credit granted in a post-crisis year. The first stage equation therefore should not be estimated with the data, but it is provided here for expository purposes.

The second stage uses the predicted change in credit to estimate the influence of *Credit* on exports growth in *i*. This also cannot be estimated with the available data.

$$\Delta \ln(Exports_{it+1}) = \gamma_0 + \gamma \Delta \ln(\hat{Credit}_{ibt+1}) + \delta X_{it} + \varepsilon_{it+1} \quad (2)$$

The **reduced form** will be the baseline regression in this paper:

$$\Delta \ln(Exports_{it+1}) = \beta_0 + \beta \Delta \ln(Liquidity_{bt}) * BANK_{ibt} * w_{ibt} + \delta X_{it} + \varepsilon_{it+1} \quad (3)$$

The unit of observation is a bank-country pair, although outcomes are at the country level, so standard errors will be clustered by country. Since *Liquidity* measures demand for credit, the predicted sign of β is negative. The change in liquidity supplied to a country is calculated for a crisis year relative to a pre-crisis year in order to capture the change from normal times. It is also possible to use alternative measures of demand, such as the demand by a single bank relative to the total. Given the nature of the banking crises and contemporary records, full recovery took at least a year. Export growth is based on the change from the post-crisis year to the crisis year for the same reason that constrained credit conditions likely affected trade in the current year as well as the subsequent one.

5.2 Preliminary Results

5.2.1 Exports

The first table presents the reduced form estimations in equation 3 with total exports (columns 1-3) and British exports (4-6). These specifications do not yet include any of the proposed controls. These show that the change in liquidity needs does not significantly impact total exports growth, but it does of just British goods in specifications 4 and 5. The linear relationships are plotted in Figures 13 and 14. The lack of significance is most likely due to aggregating the credit relationships to the country level and looking at country level outcomes. However, it is also possible that the Bank's response was so quick and significant enough to allay most of these credit channel

effects. Using port-level shipping records and even comparing the outcomes with the 1857 crisis may be helpful in both these respects.

	Total Ex	Total Ex	Total Ex	Brit Ex	Brit Ex	Brit Ex
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Liquidity$	-.008 (.005)	-.007 (.005)	-.002 (.006)	-.010 (.005)***	-.008 (.005)*	-.004 (.005)
Empire		-.051 (.076)	-.034 (.082)		-.095 (.073)	-.080 (.079)
$\Delta Liquidity * Empire$			-.014 (.010)			-.012 (.010)
Const.	-.057 (.037)	-.042 (.044)	-.046 (.045)	-.036 (.033)	-.007 (.038)	-.010 (.039)
Obs.	312	312	312	312	312	312
R^2	.011	.026	.034	.017	.065	.071

5.2.2 Imports

Using imports to Britain as the outcome variable predicts a relationship in the opposite direction: there were more imports from countries that were tied to worse-performing banks. This result is not very intuitive, and it may be due to the nature of bullion flows during the gold standard. This is another area that would benefit from using finer data.

	Total Im	Total Im	Total Im
	(1)	(2)	(3)
$\Delta Liquidity$.010 (.006)*	.012 (.006)*	.005 (.009)
Empire		-.111 (.074)	-.137 (.079)*
$\Delta Liquidity * Empire$.021 (.012)*
Const.	-.096 (.035)***	-.062 (.028)***	-.056 (.029)*
Obs.	312	312	312
R^2	.019	.087	.105

6 Conclusion & Future Work

This paper has discussed the data and empirical strategy for testing the relationship between financial institution health and trade. The detailed archival data allow for this exploration of how banking crises impacted the real economy. Preparing the data has been labor-intensive, but it has already revealed intriguing patterns in the London money market during banking crises. The preliminary results using a subset of 1866 data has illustrated interesting patterns in the data.

Future work will focus on finishing the digitization of the 1866 credit data, and obtaining the *Lloyd's Lists* data from 1866-67. The latter is likely feasible using OCR software once the books have been scanned. Several other researchers have worked with these data and have found them to be promising.

Figures

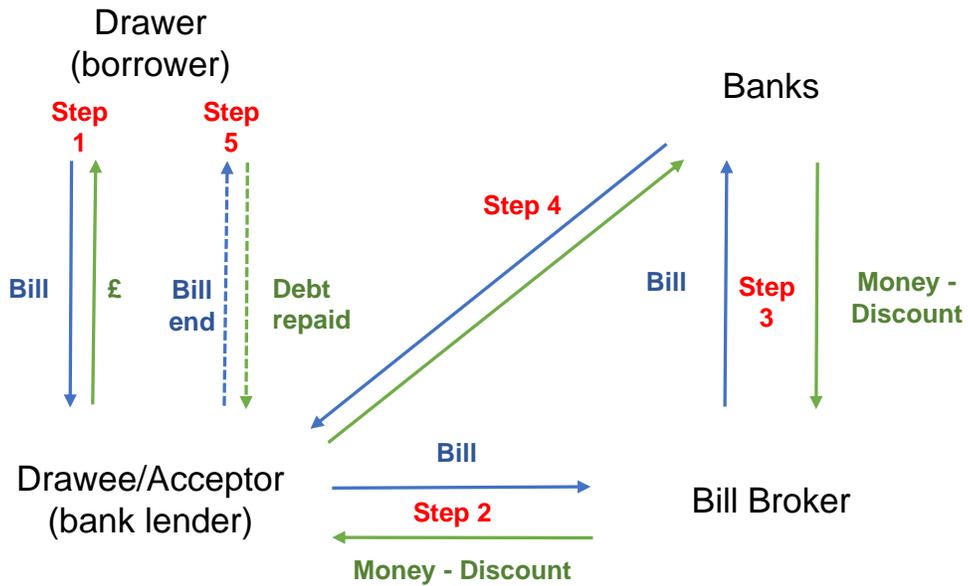


Figure 1: Bills as credit

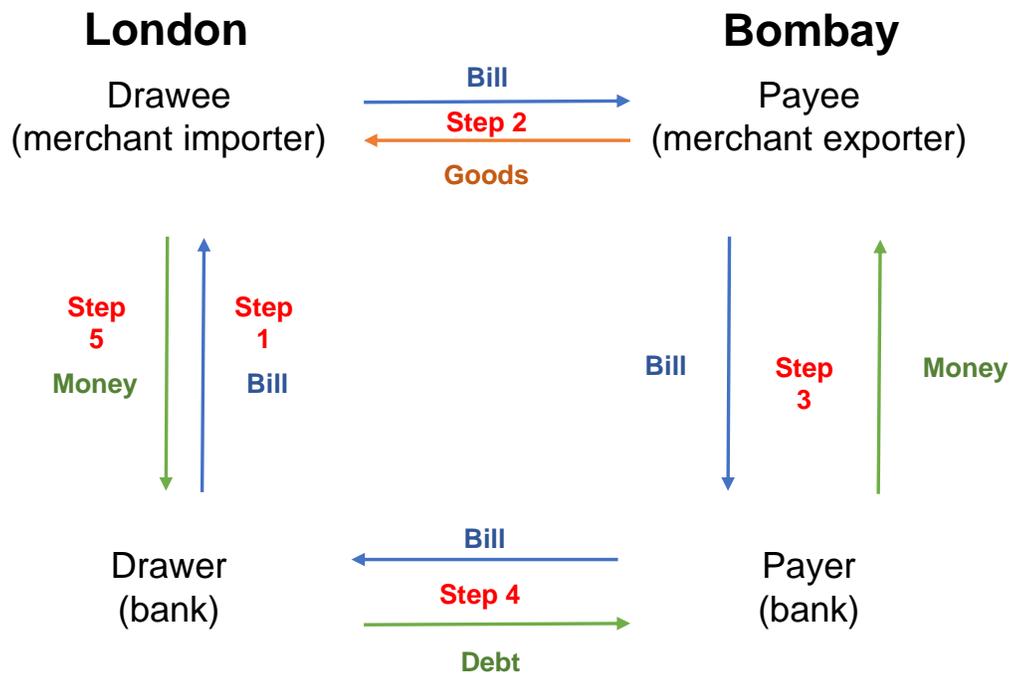


Figure 2: Bills as payment

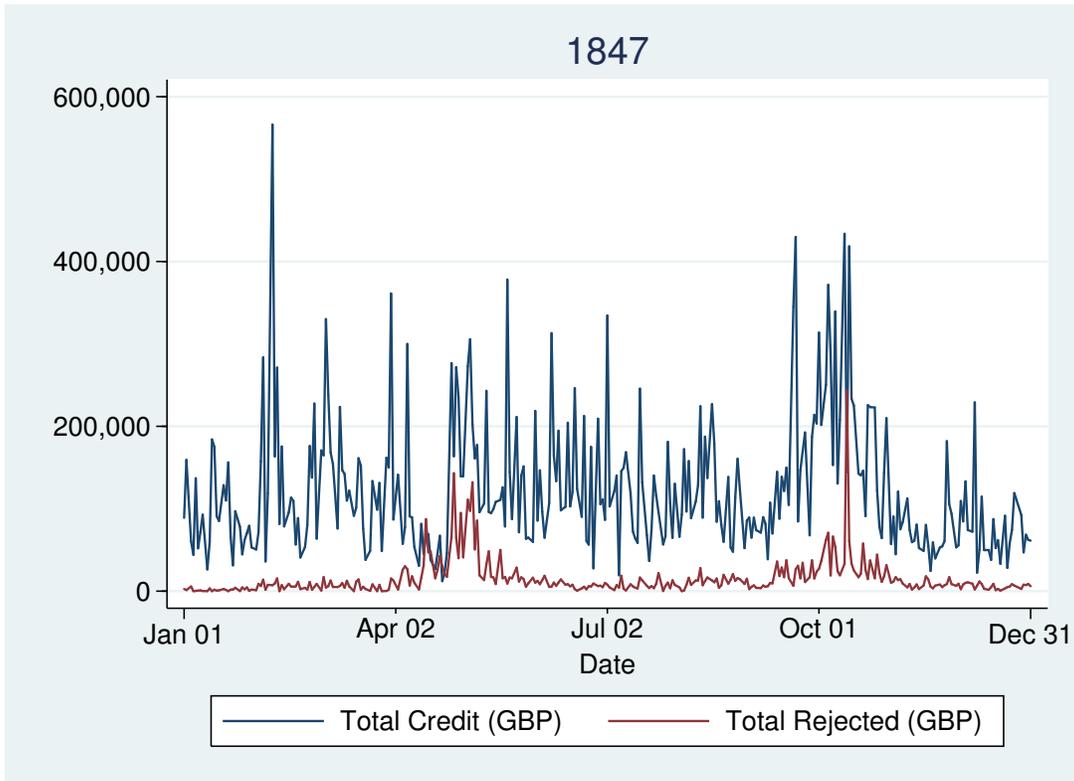


Figure 3: Daily Discounts (BOEA C28/7)

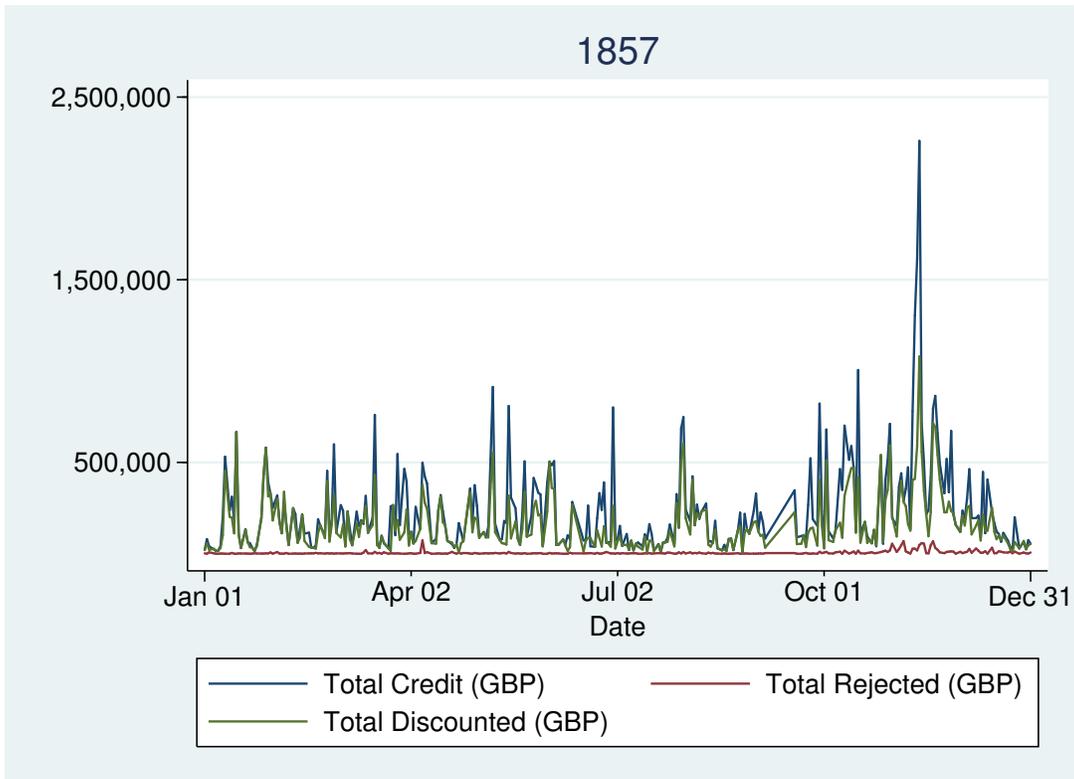


Figure 4: Daily Discounts (BOEA C28/17)

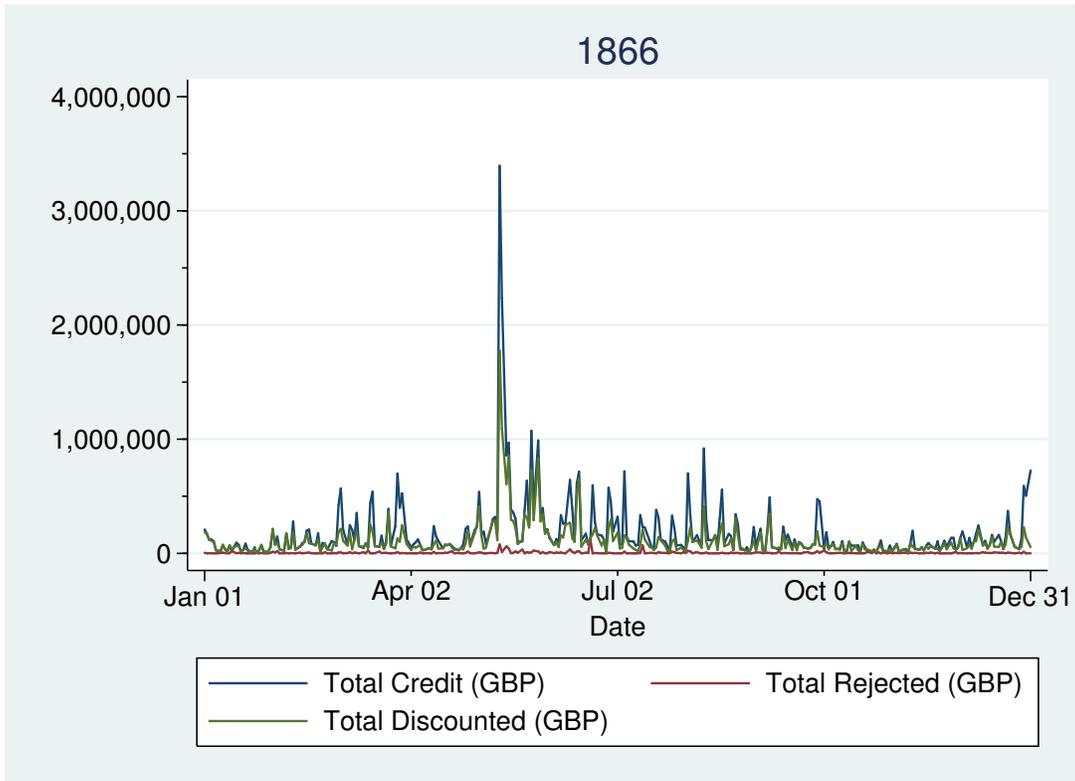


Figure 5: Daily Discounts (BOEA C28/26)

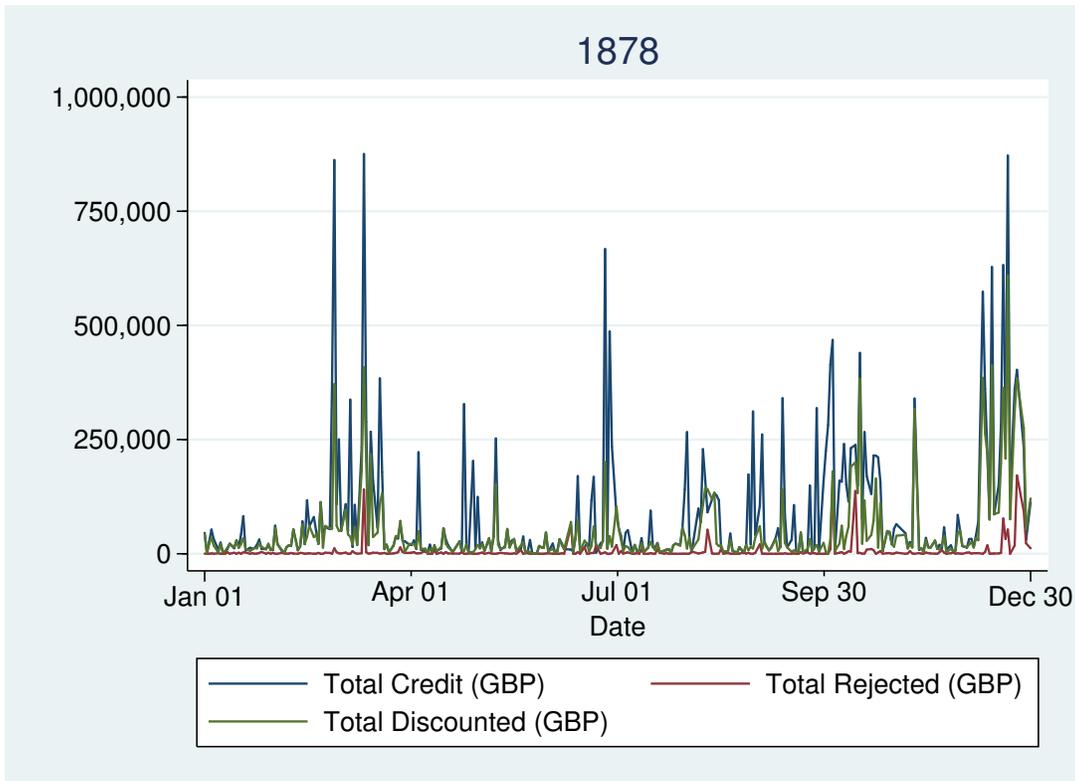


Figure 6: Daily Discounts (BOEA C28/38)

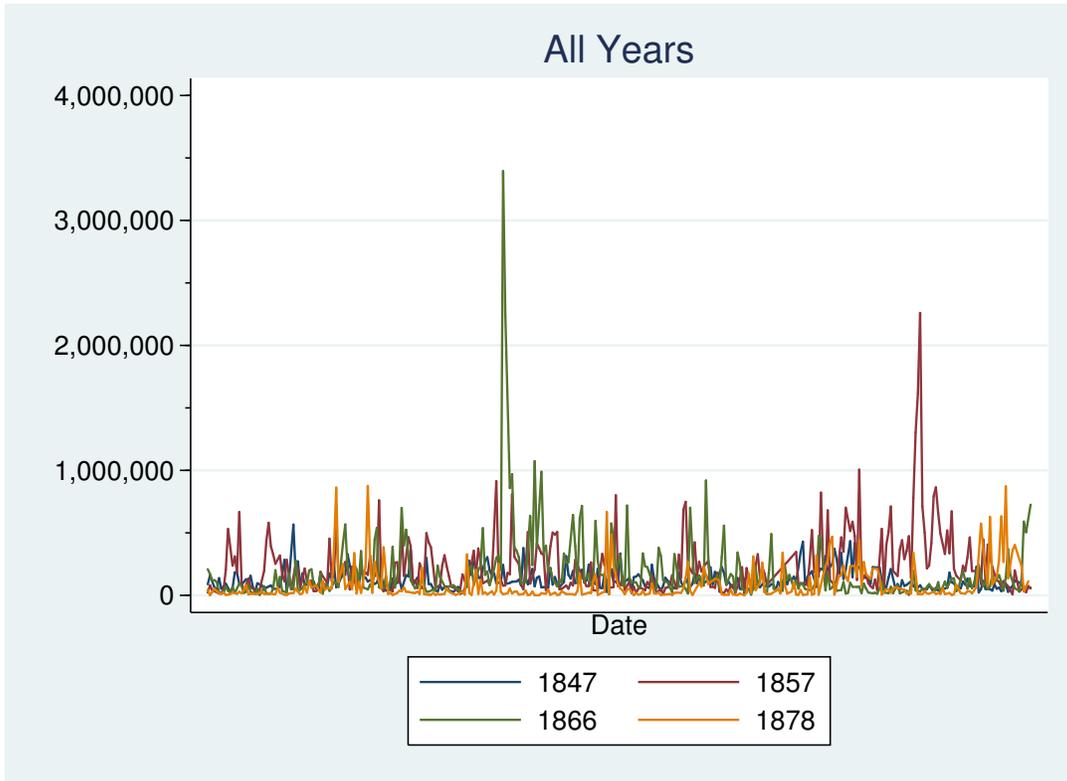


Figure 7: Comparing the credit extended by the Discount Office during the four crises

Tuesday 9th Febr 1847

Amount going off.....£ *93,704. 6.*
 Total amount discounted, Bills and Notes....£ *102,040. 4. 6*

N ^o of Bills.	Rate per Cent.	Discounters.	Bills brought in.			Bills rejected.			N ^o of Bills rejected.
			£	s.	d.	£	s.	d.	
<i>57</i>	<i>4 1/4</i>	<i>Ellis Everingh^r & Co</i>	<i>5,732</i>	<i>0</i>	<i>6</i>				
<i>104</i>	<i>4 1/4</i>	<i>W & O Devas & Co</i>	<i>5,258</i>	<i>18</i>	<i>0</i>				
<i>11</i>	<i>4</i>	<i>E Linds & Co</i>	<i>4,095</i>	<i>0</i>	<i>0</i>				
<i>13</i>	<i>4 1/4</i>	<i>Thomas Chapman</i>	<i>7,478</i>	<i>14</i>	<i>2</i>				
<i>4</i>	<i>5</i>	<i>Geo Johnson & Co</i>	<i>903</i>	<i>10</i>	<i>0</i>	<i>582</i>	<i>6</i>	<i>0</i>	<i>2</i>
<i>2</i>	<i>4 1/2</i>	<i>Chas Wallan</i>	<i>1,025</i>	<i>9</i>	<i>0</i>				
<i>DO</i>	<i>2</i>	<i>M L Magnus</i>	<i>160</i>	<i>1</i>	<i>8</i>				
<i>4</i>	<i>4</i>	<i>Sayte & Co</i>	<i>10,111</i>	<i>10</i>	<i>0</i>				

Figure 8: Sample of Daily discounts from February 9, 1847 (BOEA C28/7)

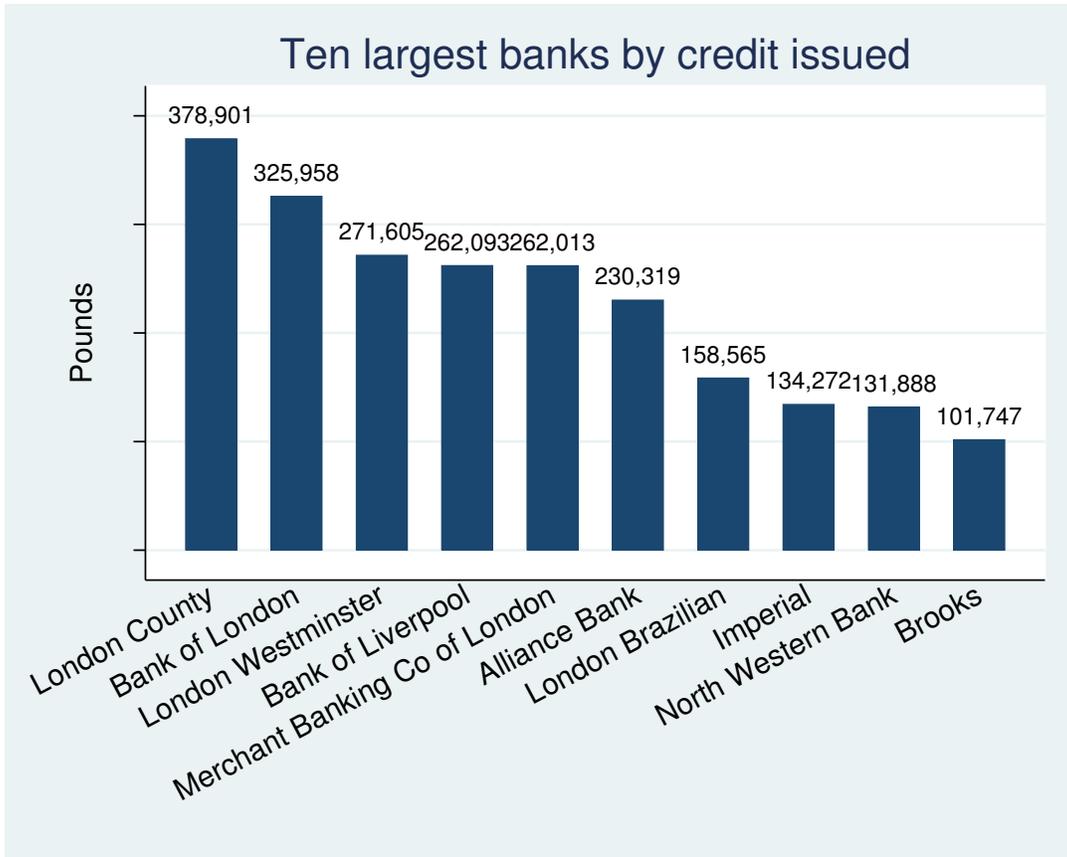


Figure 9: For context, London County Bank comprises almost 10% of the total credit in the sample.

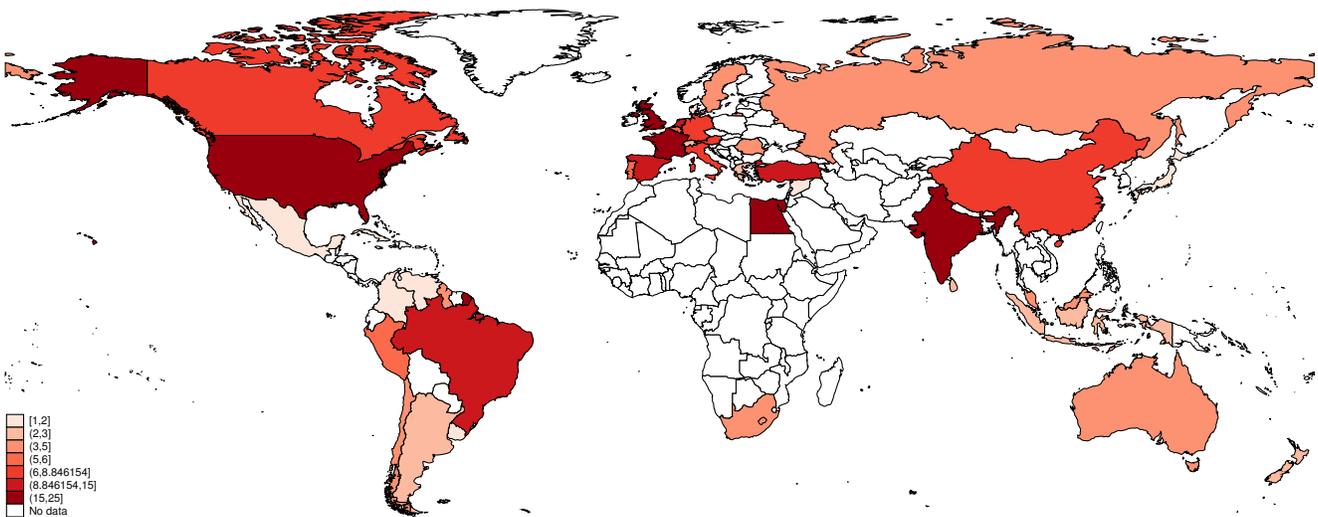


Figure 10: Number of banks that had credit relationships with a given destination

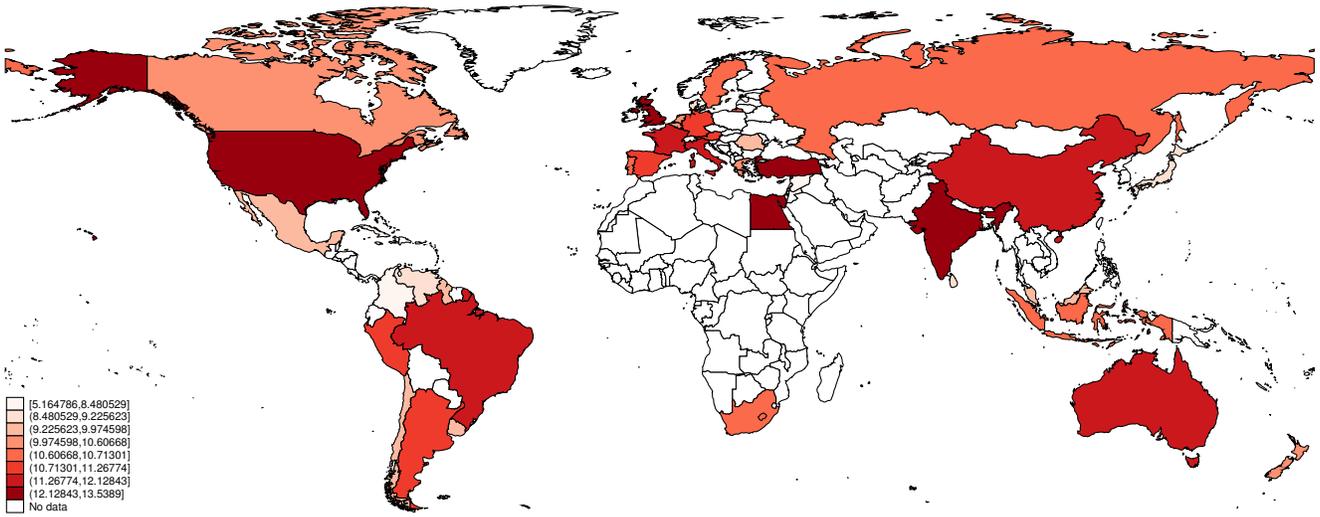


Figure 11: Total value of credit extended to a destination by British banks, log scale

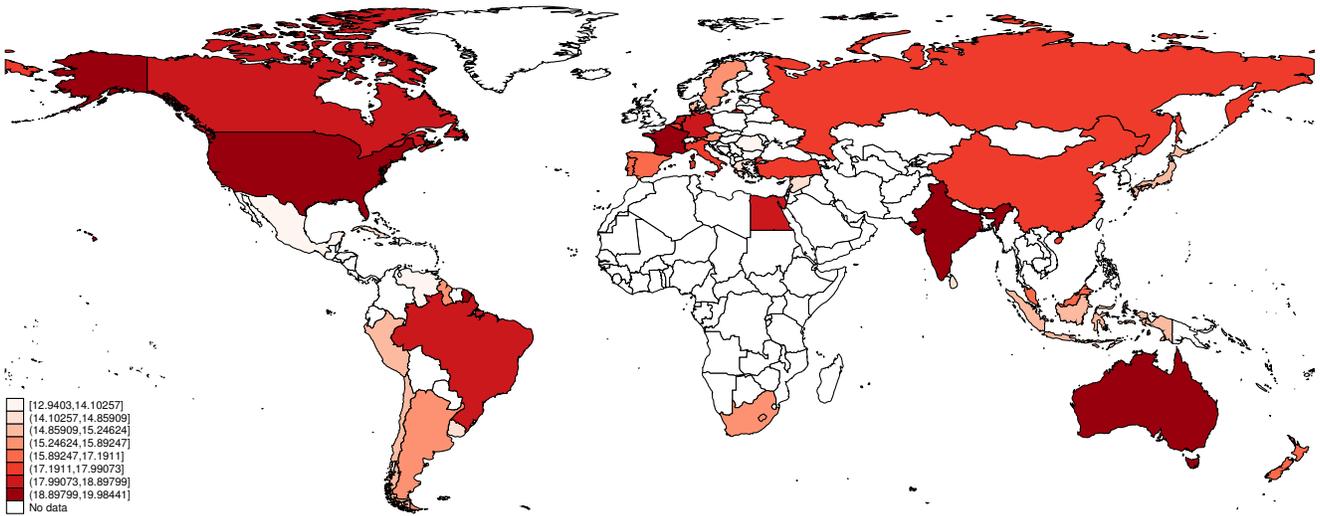


Figure 12: Exports from the UK to foreign destinations (*Statistical Abstract of the United Kingdom Vol. 15*)

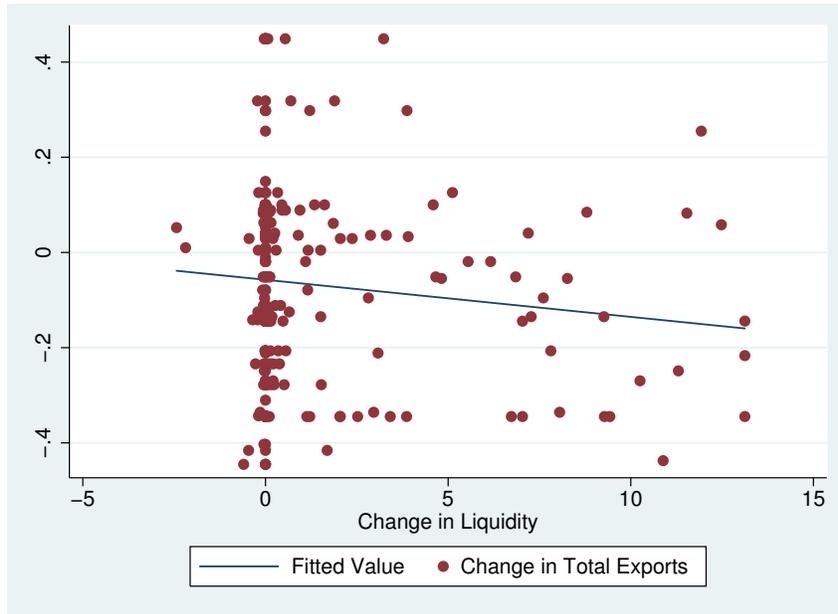


Figure 13: Scatterplot of change in Liquidity and Exports. Each dot represents a country-bank pair.

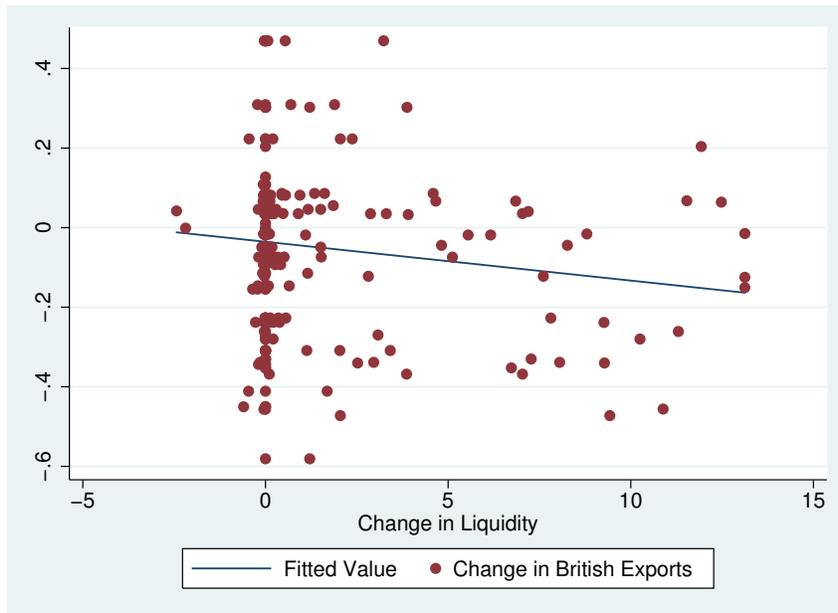


Figure 14: Scatterplot of change in Liquidity and Exports. Each dot represents a country-bank pair.

Tables

Table 1: Characteristics of the Bank Rate in crisis years

Year	Average	Min	Max	# Changes
1847	5.55	3.5	8	9
1857	7.33	5.5	10	9
1866	6.42	3.5	10	14
1878	3.67	2	6	10

Table 2: Summary statistics of distress and liquidity demand for banks in the sample

Variable	Mean	Min.	Max.
Distress	18.2%		
1865 Liquidity Demand	21,121.48	0	510,000.00
ln(Liquidity)	.96	0	13.14
1866 Liquidity Demand	82,283.28	0	1,827,521.00
ln(Liquidity)	2.89	0	14.42
Δ Liquidity	61,161.80	-201,454.95	1,317,520.77
Δ ln(Liquidity)	1.94	-2.46	13.68

Appendix: Data Documentation

6.1 Daily Discounts Data

6.1.1 BOEA C28: 1702-1709; 1847-1965

- 1847: 7
- 1856-57: 16-17
- 1865-66: 25-26
- 1877-78: 37-38

6.2 Individual Bills Data

6.2.1 BOEA C22 (Discounters Ledgers): 1845-1925

These ledgers contain the accounts of those customers, other than bill brokers and bankers, who have discount accounts. The customers generally appear in a printed list at the beginning of each volume. Two main types of entry appear on each account: (1) the purchase from or discounting with the Bank by the customer of a bill or note; (2) the purchase of a bill drawn on the customer. In either case the entries show the place of drawing, the dates of discount and maturity, the drawer, the acceptor and the amount. Advances are also shown. Before 1851, the bills entered in these ledgers were posted to the discounters accounts in With and Upon ledgers (7A337). Only amounts and dates were shown. From 1851 the functions of the With and Upon ledgers and the Discounters ledgers were merged in the Discounters With and Upon series, which comprise the major part of this series. The series contains separate index volumes.

1 Entries in the 'WITH' column in these ledgers signify that the bill has been purchased from or discounted with the discounter. The name in the 'ACCEPTOR OR DISCOUNTER' column will in that case, therefore, be that of the acceptor.

2 Entries in the 'UPON' column mean that the bill is drawn upon the account-holder. The name in the 'ACCEPTOR OR DISCOUNTER' column will in that case, therefore, be that of the discounter.

3 Folio references are given in the fourth column for 'WITH' entries in order that the relevant 'UPON' entry may be readily traced. The conventions used vary according to date and become less precise but in general the following apply:

- (i) Black folio numbers refer to the Upon ledgers (C26)

(ii) Red numbers refer to other folios in the Discounters ledgers

4 Difficulties with payment. The amount of the bill is struck out when the bill is presented. If payment is not made the following abbreviations may appear in the ledger:

n/o no orders; n/a no advice; n/f no funds; n/s not sufficient funds.

Bills remaining unpaid after a set time were entered in the Unpaid Journals and posted to accounts in the Unpaid Ledgers.

- 1865-67: 27-34

6.2.2 BOEA C24 (Bankers Ledgers): 1864-1925

Same as the Discounters ledgers (documenting both 'with' and 'upon' transactions), but specifically for customers that were listed as banks. From 1851-64 these entries appear in the Bill Brokers Ledgers (C25).

- 1865-7: 1

6.2.3 BOEA C25 (Bill brokers Ledgers): 1844-1927

These ledgers record, under the brokers' names, bills discounted with them. They show the place, the drawer, the acceptor, the value, and the dates of discount and maturity. Loans to brokers are also shown. From 1851-64 Bankers' accounts are included; after that date they appear in the Bankers Ledgers (C24). The ledgers also contain 'upon' accounts, recording the Bank's purchasing or discounting of bills accepted by brokers and bankers. C25/7 contains 'with' accounts. There are folio references. Figures in red refer to the Discounters Ledgers (C22). Figures in black refer to the Upon Ledgers (C26).

- 1866: 3

6.2.4 BOEA C26 (Upon ledgers): 1836-1906

These ledgers show, under the names of their acceptors, bills bought by or discounted with the Bank, where the *acceptors were not Bank customers*. There are no indexes to C26/1-13.

- 1866: 47-54 (note: half of these are indexes to the ledgers)

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